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tors are a guarantee of the permanent value of what will be a representative American work. It should be widely patronized. The illustrations are ample, many indeed from European sources, but with many original sketches. The paper and presswork are faultless. The work is to be issued in six imperial octavo volumes; Vol. I is to be devoted to the lower invertebrates; Vol. II to arthropods; III to the lower vertebrates; IV to birds; V to mammals, and VI to the races of man.

DAVIS AND RICE'S NORTH AMERICAN BATRACHIA AND REPTILIA FOUND EAST OF THE MISSISSIPPI RIVER.[1]—This little book presents us with the best synopsis of our cold-blooded land Vertebrata of our region which has yet appeared. The characters of the divisions are better drawn than in most American general works, though this is not very high praise. In fact there is room for much improvement in this respect, and it could hardly be otherwise, so long as no general work based on a general revision of the subject is yet published. The greatest defect is seen in the artificial keys, which are only evil, and that continually. It is well enough to have them, but they can be so constructed so as not to make specific and individual characters appear to be of generic or even of higher value. Similar objection may be made to the artificial keys in Jordan's Manual, and Coues' Key to North American Birds.

The authors extend our knowledge of the geographical distribution in a good many important points.

ON THE FORMATION OF THE EGG AND THE BLASTODERM IN THE VIVIPAROUS APHIS, by Ludwig Will.[2]—*I. The Formation of the Egg.*—Will studied by means of sections and fresh preparations the ovarian tubes of the viviparous form of Aphis. He found that the terminal chamber differed, in histological details, considerably from that hitherto described by authors. Huxley, Leuckart and Claus considered that the terminal chamber of the oviparous Aphis differed considerably from the viviparous form, not only in the whole arrangement and signification of the elements, but also in the existence of a yolk passage. Will, however, shows that in the viviparous Aphis there exists also a yolk passage, and that the arrangement of the cells in the interior of the chamber is quite the same as that in the true females, and the elements he considers as vitelligenous cells. The wall of the fully developed ovarian tube of the adult is formed of a single layer of epithelial cells, which not only covers the egg chamber but also the terminal one. Nothing was seen of the structureless tunica propria mentioned by former writers on the subject, although he used in his investigations one of Zeiss's homogeneous immersion lenses.

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[1] *Bulletin No. 5 of the Illinois State Laboratory of Natural History.* Feb., 1883, pp. 66.

[2] *Zur Bildung des Eies und des Blastoderm bei den Viviparen Aphiden.* Von LUDWIG WILL. Aus den Arbeiten d. zool. zoot. Instituts in Wurzburg, Bd. VI.

The terminal chamber, in which the egg is formed, consists of two parts. The wall of the upper part is formed of pavement epithelium, which is continued into the solid interior part. In the interior of the upper part he finds a rounded mass of protoplasm, and between this and the external layer of pavement epithelial cells is a single layer of large cells (the ovula). These cells are each connected with the internal mass by a pedicel of homogeneous protoplasm. The pavement epithelial cells pass into long cylindrical cells at the inferior part of the terminal chamber; this part of the terminal chamber contains, as a rule, only one large cell, the young egg, which is also connected with the central mass of protoplasm by a pedicel.

In the oviparous Aphis, in which a similar structure of the terminal chamber is well known, the cells of the upper part of this chamber have been generally taken for vitelligenous cells, one cell in the lower part for the egg and the pedicel for a passage for vitellus prepared by the vitelligenous cells.

Will shows, however, that at least in the agamic Aphis the elements have quite a different signification. He considers the cells in the upper to be ovula (eianlagen), and the large cell in the lower part a young egg.

The pedicel has nothing to do with a yolk passage, but only corresponds to the pedicels of the ovula.

When one of the ovula has reached a certain size it leaves the upper part of the chamber, but the pedicel remains and forms later that which the authors have called the yolk pedicel (dotterstrang); this remains until the blastoderm is developed. So we often find as many as three successive eggs in connection with the terminal chamber.

On the way downward the egg continually grows, and the cells of the epithelial covering becoming more and more depressed; the ovula do not increase in size at all.

Here two very interesting questions arise: (1) Why does one of the ovula of the terminal chamber leave its place and become a young egg? (2) Why do the eggs and not the ovula increase in size?

(1) At the time when no ovulum has yet left the terminal chamber, and when all the elements of this part of the ovary are of the same size, all the cells necessarily assimilate and grow in the same way. There is no reason at all why they should not, for the ovula are all of the same size and age, and besides this they are all equally near the walls of the chamber and receive an equal supply of nourishment from the blood which bathes the exterior wall of the chamber. The cells grow equally, and exert a great pressure in the wall of the chamber, and the result must be a bursting of the wall of the chamber or a protrusion of one of the ovula into the chamber below. At the base of the chamber, where it passes into the oviduct, the resistance is much less

than that at any other point, consequently the ovulum at this point passes out, drawing with it the pedicel of protoplasm which still remains in connection with the central mass, which Will calls the "*rachis*," and which corresponds to the rachis in the *nematodes*. The ovules have now a chance to grow again, and when the pressure is again exerted another passes out.

(2) In a similar way the growth of the young egg is explained. The ovula as well as the young eggs being connected with the rachis by a string of protoplasm they cannot be considered as distinct cells, for it must be considered that the protoplasm is common to all the cells. It is evident that the new protoplasm which the egg and ovula acquire by a process of assimilation is common as well. The pressure exerted upon the epithelial layer of the egg is not as great as that upon the wall of the terminal chamber and consequently there is much less pressure on the egg than on the ovula. Owing to the great pressure on the ovula, the growth is not so rapid as in the egg, consequently much of the common protoplasm of the terminal chamber goes for the nourishment of the egg through its pedicel.

The cells of the terminal chamber not being vitelligenous cells but ovula, the pedicel is consequently not for the passage of yolk but protoplasm.

II. Formation of the Blastoderm.—The young egg, which possesses no membrane at all, consists of a very homogeneous protoplasm. The clear germinal vesicle (keimbläschen) does not take any color in carmine, while the dense germinal spot (keimfleck) takes a deep stain.

By examining large numbers of eggs in the first stages of development Will finds that the germinal vesicle does not disappear. The first change consists in the appearance of a great number of little vesicles of deutoplasm which are quite different from the later fully developed deutoplasm called by Metschnikoff "secondärer dotter." These vesicles fill up the whole protoplasm with the exception only of that near the periphery of the egg and that which immediately surrounds the germinal vesicle which is really not surrounded by deutoplasm but lies in an irregular layer of protoplasm. In section he found the primitive nuclei in different stages of division, so that the nuclei of the future cells are derived directly from the germinal vesicle. After division of the germinal vesicle, each part becomes surrounded by a layer of protoplasm, and passes to the peripheral protoplasmic layer, where they undergo division and form the future cells of the blastoderm. The blastoderm consists of a single layer of cells which possess a common protoplasm and only later do they become separate. The blastoderm does not cover the whole surface of the egg, for at one pole (the basal), the deutoplasm extends to the surface of the egg.

Will differs considerably from A. Brandt as regards cell division, and considers him wrong in a number of other points. He describes a division which is only known in Actinosphærum, where it was described some time ago by Grube.

The principal thing is that it begins with a change in the nucleolus, which breaks up into a great many little particles. These particles are arranged in a definite way so as to form different figures, of which the rod-like form (stäbchenform) is the most common and characteristic. The substance of the nucleus is not modified at all, and only its exterior form is changed. From a spherical vessel it changes to an elliptical, and then into a biscuit-shaped body, after which stage the division takes place.

Will also criticises the "keimbläschentheorie" of A. Brandt, where Brandt considers the germinal vesicle a cell. The theory is based on the idea that the germinal vesicle equals the epithelial as well as the blastodermic cells. Will finds that this basis is false and consequently the theory built upon it is also false.—*B. Sharp.*

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